

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of)	
)	
Liberty Defense Holdings, Ltd.)	ET Docket No. _____
d/b/a Liberty Defense Technologies)	
)	
Request for Waiver of Sections 15.31(c), 15.503(d),)	
15.511(b), 15.511(f) and 15.521(d) of the Commission's)	
Rules		

To: The Office of Engineering and Technology

REQUEST FOR WAIVER

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TABLE OF CONTENTS

EXECUTIVE SUMMARY	ii
I. BACKGROUND	2
<i>A. LIBERTY DEFENSE HOLDINGS, LTD</i>	<i>2</i>
<i>B. THE NEED TO SECURE SOFT TARGETS AND CROWDED PLACES IS INCREASING</i>	<i>3</i>
<i>C. LIBERTY'S HEXWAVE SYSTEM.....</i>	<i>4</i>
II. LIBERTY REQUESTS WAIVER OF SEVERAL PART 15 RULES FOR THE HEXWAVE SYSTEM.....	6
<i>A. WAIVER OF SECTIONS 15.503(D), 15.31(C), AND 15.521(D).....</i>	<i>6</i>
<i>B. WAIVER OF SECTIONS 15.511(B) AND (F).....</i>	<i>9</i>
III. GRANT OF LIBERTYS' WAIVER REQUESTS IS CONSISTENT WITH THE PUBLIC INTEREST	13
<i>A. THE GOOD CAUSE WAIVER STANDARD.....</i>	<i>13</i>
<i>B. GOOD CAUSE EXISTS FOR GRANT OF THE REQUESTED WAIVER</i>	<i>13</i>
1. The Substantial Public Interest Benefits Generated by Grant of the Waiver Outweigh Any Benefits from Strict Application of the Rules	13
2. Strict Compliance with the Rules Is Inconsistent with the Public Interest	14
3. Grant of the Waivers Will Not Cause Interference to Authorized Users of the 6.9-10.6 GHz Band	15
IV. CONCLUSION	16

EXECUTIVE SUMMARY

Liberty Defense Holdings, Ltd. d/b/a Liberty Defense Technologies (“Liberty”) provides concealed weapon detection solutions to protect high-traffic areas, including hotels, schools, airports, public transit systems, sports and entertainment venues, outdoor pedestrian plazas, and other locations. Liberty’s HEXWAVE system, which uses active three-dimensional imaging, detects metallic and non-metallic firearms, knives, explosives, and other threats using a proprietary ultra-wideband (“UWB”) surveillance technology operating in the 6.0-10.6 GHz frequencies. HEXWAVE monitors multiple entry points seamlessly, screening people and their belongings in real-time. It provides discrete, modular, and scalable concealed weapons detection capabilities at stand-off distances to proactively counter evolving urban threats in indoor and outdoor settings. Importantly, HEXWAVE enables law enforcement and security professionals to engage a target before a situation can escalate into an attack.

To facilitate the certification, marketing, and deployment of HEXWAVE, Liberty requests the Commission to waive Sections 15.31(c), 15.503(d), 15.511(b), 15.511(f), and 15.521(d) of its rules and impose certain conditions on these waivers. The waivers will permit HEXWAVE to operate using a swept-frequency approach and will expand the eligible users of the system to include security professionals, in addition to federal, state, and local law enforcement personnel. Good cause exists for Commission grant of the waivers because the need for innovative new technologies to protect soft targets and crowded places is at an all-time high and still increasing. Further, the waivers pose no meaningful risk of interference to authorized users. UWB systems have been operating in the 6.0-10.6 GHz band for many years, and harmful interference has not occurred to licensed services. In addition, the requested waivers are consistent with Commission precedent and do not undermine the objectives of the Commission’s UWB rules.

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To: The Office of Engineering and Technology

REQUEST FOR WAIVER

Liberty Defense Holdings, Ltd. d/b/a Liberty Defense Technologies ("Liberty"), pursuant to Section 1.3 of the Commission's rules,¹ respectfully requests the Federal Communications Commission ("Commission"), acting through its delegation of authority to the Office of Engineering and Technology, to waive Sections 15.31(c), 15.503(d), 15.511(b), 15.511(f), and 15.521(d) of the Commission's rules (collectively "Rules"), each of which is discussed further herein.² Grant of this waiver will permit Liberty to certify and market its new and innovative HEXWAVE concealed weapons detection system, which is an ultra-wideband ("UWB") surveillance system that will operate in the 6.0-10.6 GHz frequencies. HEXWAVE offers significant public safety benefits to law enforcement, security professionals, and, most importantly, the general public. It does not pose any meaningful risk of interference to authorized

¹ 47 C.F.R. § 1.3. *See also* *ICO Global Communications (Holdings) Limited v. FCC*, 428 F.3d 264 (D.C. Cir. 2005); *Northeast Cellular Telephone Co. v. FCC*, 897 F.2d 1164 (D.C. Cir. 1990); *WAIT Radio v. FCC*, 418 F.2d 1153 (D.C. Cir. 1969).

² 47 C.F.R. §§ 15.31(c), 15.503(d), 15.511(b), 15.511(f), 15.521(d).

users for its operational frequencies, and the waivers requested by Liberty are consistent with Commission precedent.

I. BACKGROUND

A. LIBERTY DEFENSE HOLDINGS, LTD

Liberty is committed to protecting communities and preserving peace of mind through superior solutions for the detection of concealed weapons in a non-intrusive manner. Its HEXWAVE system, which is anticipated commercially launching in 2020, provides both security and freedom of movement using a discrete technology that monitors multiple entry points seamlessly, screening people and their belongings in real-time.³ HEXWAVE can efficiently secure public and private high-traffics areas, including hotels, schools, airports, public transit systems, sports and entertainment venues, outdoor pedestrian plazas, and other locations. It utilizes an active three-dimension (“3D”) imaging technology that was developed by MIT Lincoln Laboratory.⁴

³ See John Murawski, *AI Surveillance Systems Can Work Without Facial Recognition*, Wall St. J. (May 1, 2019), https://www.wsj.com/articles/ai-surveillance-systems-can-work-without-facial-recognition-11556703001?emailToken=9e751dbf9fdaf424ba0177506af601caWAQJPIPkf31n-9mc22HXNXW2Tuyx6AsxFphWzzesFN/+E4eIyOO2xWTQJ6nT6mZ69C89hNz/bMD1SMaczUUIPnkxw/ZwKQwQoh8BmebVseqOuaQkVta8DQLLIIfyF81RJv&reflink=article_copyURL_share&utm_source=Website+Subscribers+%3A+Email+Updates&utm_campaign=ebfdde297c-EMAIL_CAMPAIGN_2019_05_01_08_21&utm_medium=email&utm_term=0_02c987fa74-ebfdde297c-69770883 (discussing the HEXWAVE system); Buckley Smith, *Vancouver’s Rogers Arena to Test Liberty Defense’s AI-Powered Weapons Detection Technology*, itbusiness.ca (Apr. 17, 2019), <https://www.itbusiness.ca/news/vancouvers-rogers-arena-to-test-liberty-defenses-ai-powered-weapons-detection-technology/110064> (discussing an initial Canadian deployment of HEXWAVE); Patrice Fusillo, *Firm With Innovative Hexwave Product That Uses Technology Licensed from MIT and AI to Detect Public Shooters Begins Trading*, Streetwise Reports (Apr. 8, 2019), <https://www.streetwisereports.com/article/2019/04/08/firm-with-innovative-hexwave-product-that-uses-technology-licensed-from-mit-and-ai-to-detect-public-shooters-begins-trading.html>.

⁴ Liberty has secured an exclusive license and technology transfer agreement in connection with the patents underlying the MIT Lincoln Laboratory technology.

Founded in 2018,⁵ Liberty is headquartered in Vancouver, Canada, and has an operations and research and development center in Peachtree Corners, Georgia. Drawing experience from successful ventures in a range of fields, the management team and board of directors of Liberty are composed of leaders in the security industry, product development, government, technology, and manufacturing.⁶

B. THE NEED TO SECURE SOFT TARGETS AND CROWDED PLACES IS INCREASING

According to the Department of Homeland Security (“DHS”), soft targets and crowded places (“ST-CPs”) are “attractive targets for various threat actors”⁷ because they are especially vulnerable to attacks and difficult to secure.⁸ ST-CPs are “easily accessible to large numbers of people and ... have limited security or protective measures in place.”⁹ They include “schools, sports venues, transportation systems or hubs, shopping venues, bars and restaurants, hotels,

⁵ Liberty’s stock commenced trading on the Toronto Stock Exchange (TSXV Ticker: SCAN) and the Frankfurt stock exchange (FWB Ticker: LD2) in April 2019. *See* Press Release, Liberty Defense, *Liberty Defense Commences Trading on the Frankfurt Exchange under the Symbol “LD2”* (Apr. 25, 2019), <https://www.libertydefense.com/news/liberty-defense-commences-trading-on-the-frankfurt-exchange-under-the-symbol-ld2/>; Press Release, Liberty Defense, *Liberty Defense Commences Trading on the TSX Venture Exchange under the symbol “SCAN”* (Apr. 9, 2019), <https://www.libertydefense.com/news/liberty-defense-commences-trading-on-the-tsx-venture-exchange-under-the-symbol-scan/>.

⁶ Biographical information for the Liberty management team and board of directors can be found at: Liberty Defense, Company, <https://www.libertydefense.com/company/> (last visited May 7, 2019).

⁷ *See* U.S. Department of Homeland Security, *Soft Targets and Crowded Places Security Plan Overview*, at 1 (May 2018) (“DHS Report”), https://www.dhs.gov/sites/default/files/publications/DHS-Soft-Target-Crowded-Place-Security-Plan-Overview-052018-508_0.pdf.

⁸ *See also* Marybeth Kelliher, *Protecting Public Spaces and Soft Targets*, DIPNote (Sept. 7, 2018), <https://blogs.state.gov/stories/2018/09/07/en/protecting-public-spaces-and-soft-targets> (discussing the particular vulnerability of soft targets and the need to “better protect the places where the public freely gathers”).

⁹ *Id.* at iii.

places of worship, tourist attractions, theaters, and civic spaces,” although “ST-CPs do not have to be buildings and can include open spaces such as parks and pedestrian malls.”¹⁰ In a May 2018 report regarding the vulnerability of ST-CPs, DHS was strident in its warning:

[B]ad actors are evolving tactics through observation of actual or perceived successes in the U.S. and elsewhere, trial and error, and the exchange of information over the internet and social media. Extremist literature and other media not only call for disaffected individuals to conduct attacks by any available means, but also provide the know-how through simple and clear instructions for making explosives and improvised explosive devices (IEDs), and using guns, knives, vehicles, and other readily accessible tools to kill and maim unsuspecting individuals. The fact that highly lethal attacks on ST-CPs can be executed with little planning or expertise and are often able to remain undetected until operational, together with the sheer volume of STCPs, presents a significant security challenge.¹¹

And the threat to ST-CPs only is increasing over time as the number and deadliness of active shooter incidents in the United States increases.¹²

C. LIBERTY’S HEXWAVE SYSTEM

Liberty’s HEXWAVE system is ideally suited to help mitigate the increasing threat to ST-CPs. HEXWAVE is designed to provide discrete, modular, scalable, and real-time concealed weapons detection capabilities to proactively counter evolving urban threats in indoor and outdoor settings. As a standalone system or used in conjunction with other security products,

¹⁰ *Id.* at 1.

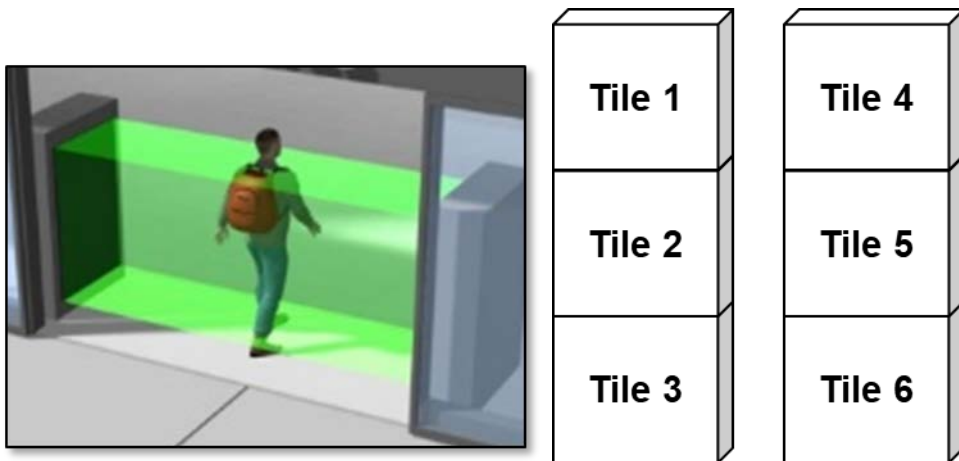
¹¹ *Id.* at 2. According to DHS, “[a]mong other incidents, the U.S. recently has experienced mass shootings in schools, a community center, a movie theater, and a concert; an edged weapon attack at a shopping mall; vehicles used as weapons to target individuals on a pedestrian walkway and at a public rally; and the detonation or attempted detonation of improvised explosive devices at sporting events and other places of mass gatherings.” *Id.* at 1.

¹² See Federal Bureau of Investigation, Quick Look: 250 Active Shooter Incidents in the United States from 2000 to 2017, (last visited on May 7, 2019), <https://www.fbi.gov/about/partnerships/-office-of-partner-engagement/active-shooter-incidents-graphics> (finding that, on average, the number of incidents and number of casualties from active shooter events in the US has risen steadily since 2000).

HEXWAVE enables law enforcement and security professionals to provide layered protection at ST-CPs at stand-off distances. It can be installed in both covert and overt locations. HEXWAVE provides early warning of a threat to enable law enforcement and security professionals to engage a target before a situation can escalate into an attack. HEXWAVE scans crowds to detect firearms, knives, explosives, and other threats.

The HEXWAVE system consists of a pair of antenna panels, each of which consists of three antenna array “tiles” composed of 64 transmit antennas and 16 receive antennas.¹³ The antenna panels transmit and receive low-power radar waves that capture rich information (e.g., size, shape, depth) about the detection space and generate 3D images in real-time. These images have high enough resolution to discern the difference between a benign object, like a cellphone, and a threat, such as a knife, gun, or a pipe bomb, even when these objects are concealed underneath clothing or in hand-held baggage, backpacks, or handbags. The radio signals reflect off both metallic and non-metallic objects and therefore can detect any concealed material that has a physical form. Further, the images produced by HEXWAVE’s antenna panels are used to train and enhance the system’s artificial intelligence using machine learning algorithms. The algorithms enhance sensor fidelity and provide decisional hierarchy (i.e., high threat: take action; medium threat: track; low threat: pass).

¹³ Each transmit/receive antenna element pair makes up a single “phase center.” Thus, each tile contains 1024 unique phase centers, and each antenna panel contains a total of 3072 phase centers. Each panel contains two independent receivers, such that a full scan of every phase center can be done using 1536 individual transmissions.



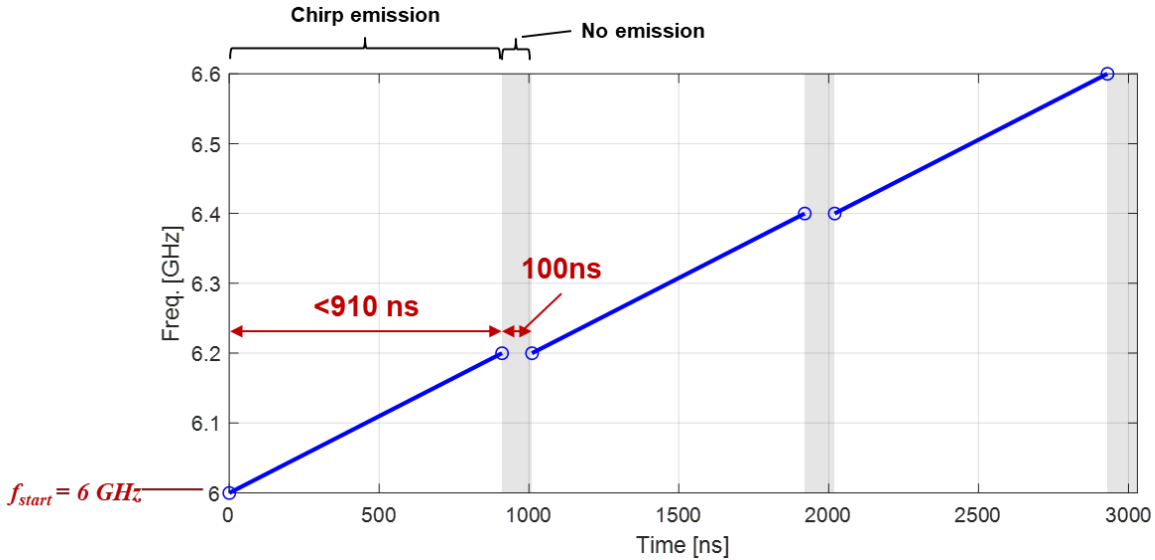
II. LIBERTY REQUESTS WAIVER OF SEVERAL PART 15 RULES FOR THE HEXWAVE SYSTEM

A. WAIVER OF SECTIONS 15.503(D), 15.31(C), AND 15.521(D)

Section 15.503(d) of the Commission’s rules require UWB transmitters to “at any point in time” have a fractional bandwidth equal to or greater than 0.20 or to have a UWB bandwidth equal to or greater than 500 MHz.¹⁴ The HEXWAVE system, by contrast, operates using a set of “chirplets.” It sweeps a CW signal through a 200 MHz block of spectrum in a range of 350 to 910 nanoseconds (“ns”),¹⁵ and then is silent for 100 ns. Thereafter, it sweeps through the next 200 MHz block of spectrum. These chirplets are grouped together in sets of three, spanning a total of 600 MHz, as indicated in the figure below.

¹⁴ This requirement stems from the definition of the term “Ultra-wideband (UWB) transmitter” set forth in the Commission’s rules: “An intentional radiator that, *at any point in time*, has a fractional bandwidth equal to or greater than 0.20 or has a UWB bandwidth equal to or greater than 500 MHz, regardless of the fractional bandwidth.” 47 C.F.R. § 15.503(d) (emphasis added).

¹⁵ The sweep rate determines the clarity of each frame and the probability of detection of prohibited items. Longer sweep times will provide a better signal-to-noise ratio, and thus better clarity and increased probability of detection. Shorter sweep times will produce a faster capture time and less blurring.



Assuming the worst-case 910 ns sweep time, the transmitter sweeps through this 600 MHz block a total of up to 1536 times (i.e., once per transmit and receive antenna element pair) in about 4.7 milliseconds (“ms”). The transmitter then moves on to the next 600 MHz block of spectrum. In this fashion, the HEXWAVE transmitter operates in the following spectrum blocks:

- 6.0-6.6 GHz
- 6.6-7.2 GHz
- 7.2-7.8 GHz
- 7.8-8.4 GHz
- 8.4-9.0 GHz
- 9.0-9.6 GHz
- 9.6-10.2 GHz
- 10.2-10.6 GHz

This transmit cycle lasts a total of 35.7 ms and is repeated every 100 ms.

Because of the swept-frequency nature of HEXWAVE’s chirplets, the HEXWAVE transmitter does not instantaneously occupy 500 MHz as specified in Section 15.503(d). Consequently, Liberty requests a waiver of the UWB bandwidth requirement in Section 15.503(d) subject to Proposed Condition No. 1(a) set forth in Exhibit A.

Liberty also requests a related waiver of Section 15.31(c) and, to the extent required, Section 15.521(d) of the Commission’s rules concerning measurement procedures used to show

compliance with the rules. Section 15.31(c) requires that, for swept frequency equipment, measurements shall be made with the frequency sweep stopped.¹⁶ Section 15.521(d) requires that, when the transmitter is quiescent for intervals that are long compared to the nominal pulse repetition interval, measurements shall be made with the pulse train gated on.¹⁷ However, Section 15.521(d) also permits the Commission to accept alternative measurement procedures. Consequently, the Commission could determine that no waiver of Section 15.521(d) is required in this instance because the alternative measurement procedure that will be proffered by Liberty is adequate.

The Commission has granted previous waivers of Sections 15.503(d), 15.31(c), and 15.521(d) both to allow various UWB systems to operate with instantaneous bandwidths less than 500 MHz and to make certification measurements with the transmitter operating in its normal operating mode.¹⁸ Liberty requests similar waivers to allow operation of its swept frequency system with an instantaneous bandwidth of less than 500 MHz, as well as to allow certification

¹⁶ Section 15.31(c) states: “Except as otherwise indicated in § 15.256, for swept frequency equipment, measurements shall be made with the frequency sweep stopped at those frequencies chosen for the measurements to be reported.” 47 C.F.R. § 15.31(c). (Section 15.256 is not germane to the HEXWAVE device because that rule only applies to “level probing radar (LPR) devices.” 47 C.F.R. § 15.256(a).).

¹⁷ Section 15.521(d) states: “Radiated emission levels above 960 MHz are based on RMS average measurements over a 1 MHz resolution bandwidth. The RMS average measurement is based on the use of a spectrum analyzer with a resolution bandwidth of 1 MHz, an RMS detector, and a 1 millisecond or less averaging time. Unless otherwise stated, if pulse gating is employed where the transmitter is quiescent for intervals that are long compared to the nominal pulse repetition interval, measurements shall be made with the pulse train gated on. *Alternative measurement procedures may be considered by the Commission.*” 47 C.F.R. § 15.521(d) (emphasis added).

¹⁸ See, e.g., *Petition for Waiver of the Part 15 UWB Regulations Filed by the Multi-band OFDM Alliance Special Interest Group*, Order, 20 FCC Rcd 5528 (2005); *Curtiss-Wright Controls Inc. Request for Waiver of Part 15 of the Commission’s Rules Applicable to Ultra-Wideband Devices*, Order, 27 FCC Rcd 234 (OET 2012); *Kyma Medical Technologies Ltd., Request for Waiver of Part 15 of the Commission’s Rules Applicable to Ultra-Wideband Devices*, Order, 31 FCC Rcd 9705 (OET 2016) (“*Kyma Medical Order*”).

measurements to be made with the transmitter operating in its normal operating mode. Liberty proposes for the waivers to be subject to Proposed Condition No. 1(b) in Exhibit A.

B. WAIVER OF SECTIONS 15.511(B) AND (F)

Liberty's HEXWAVE system is designed to protect high-traffic public venues. At many such venues, security functions are provided by employees of the venue or by private security companies that are hired to provide security and guest/public screening services. Consequently, in many cases the individuals and entities charged with security operations will not be governmental law enforcement organizations as defined in the Commission's UWB rules. DHS has acknowledged the important role of private security professionals in protecting ST-CPs, and it has also emphasized the need for the government to support such private security efforts. According to DHS:

Private industry, primarily through private security providers and professionals, play a key part in protecting ST-CPs. In many cases, private security personnel—including security contractors, risk analysis experts, and private security officers—are directly responsible for strengthening the security of ST-CPs. They often are the first line of defense against an attack. Consequently, they must be well-trained, professional, and held to a standard of excellence. *Governments have a role in supporting the private security sector to achieve this* as well as in ensuring private sector security operators meet certain standards.¹⁹

Section 15.511(b) of the Commission's rules limits operation of UWB surveillance systems to law enforcement, fire or emergency rescue organizations, and manufacturers licensees,

¹⁹ DHS Report at 3. *See also* Global Counterterrorism Forum, *The GCTF Soft Target Protection Initiative: Antalya Memorandum on the Protection of Soft Targets in a Counterterrorism Context*, <https://www.thegctf.org/Portals/1/Documents/Links/Meetings/2017/Twelfth%20GCTF%20Coordinating%20Committee%20Meeting/GCTF%20-%20Antalya%20Memorandum%20on%20the-%20Protection%20of%20Soft%20Targets%20in%20a%20Counterterrorism%20Context.pdf?ver=2017-09-17-010844-720> (“[S]oft targets are largely privately owned and operated” and therefore “[e]ffective security ... requires a strong and sustained partnership between government and private owners and operators and among businesses themselves”).

petroleum licensees, and power licensees.²⁰ This narrow set of eligible users, on its face, does not include private security professionals, even though reliance on such private security teams is an important component of efforts to protect vulnerable facilities and public gatherings nationwide. Therefore, Liberty requests a waiver of Section 15.511(b) to allow security professionals that do not qualify as governmental law enforcement to operate its HEXWAVE system, in addition to conventional federal, state, and local law enforcement agencies.²¹

The Commission previously granted a similar waiver to Headsight to permit Headsight to expand the group of eligible users of its UWB system.²² Headsight requested relief from restrictions in the UWB rules that limit the use of ground penetrating radar (“GPR”) devices to applications associated with law enforcement, firefighting, emergency rescue, scientific research, commercial mining, and construction. In granting the waiver, the Commission noted that “the purpose of this restriction is to ensure that GPR devices are used infrequently with a low proliferation rate, in order to avoid causing harmful interference to other authorized users.”²³ The

²⁰ Section 15.511(b) states: “Operation under the provisions of this section is limited to fixed surveillance systems operated by law enforcement, fire or emergency rescue organizations or by manufacturers licensees, petroleum licensees or power licensees as defined in §90.7 of this chapter. ... Parties operating under the provisions of this section must be eligible for licensing under the provisions of part 90 of this chapter.” 47.C.F.R. §§ 15.511(b), (b)(1).

²¹ See Proposed Condition No. 1(c), 3 in Exhibit A.

²² See *Headsight, Inc. Request for Waiver of Part 15 of the Commission’s Rules Applicable to Ultra-Wide Band Devices*, Order, 32 FCC Rcd 1511 (OET 2017).

²³ *Id.* at 1514 ¶ 9. The Commission determined that Headsight’s proposal to permit agricultural use of its device, even though agricultural use is not one of the uses permitted under the Commission’s rules, “does not differ greatly from any other permissible use listed” and “will not increase the potential for harmful interference to authorized users.” *Id.* at 1515 ¶ 13, 1516 ¶ 15. Therefore, according to the Commission “grant of the waiver will not undermine the purpose of the rule” and there are “stronger public interest benefit in granting this waiver than in strictly applying the rule” as a result of the increase in agricultural productivity that the Headsight device maybe enable. *Id.* at 1516 ¶¶ 15, 16.

same rationale applies to Liberty's HEXWAVE system. The HEXWAVE system is intended to be used in limited locations by trained security professionals, and its price point will limit its proliferation to high priority events and locations. It is not a mass market consumer device, and it does not have widespread consumer application. For these reasons, as with the Headsight device, Commission grant of Liberty's waiver request will not result in unreasonably high proliferation of HEXWAVE devices.

In addition, Section 15.511(b)(2) requires devices operating as surveillance systems to be coordinated in the manner detailed in the Commission's UWB rules.²⁴ Liberty requests a waiver of this coordination requirement in conjunction with the Section 15.511(b)(2) user eligibility waiver discussed above. As with the eligibility requirement, the Commission also previously has granted a waiver of this coordination requirement.²⁵ Moreover, in the 17 years since UWB services were first authorized in 2002, harmful interference from UWB systems has not been an issue. Consequently, the coordination requirement is an unnecessary administrative burden with no concomitant benefit.

²⁴ Section 15.511(b)(2) states that "[t]he operation of imaging systems under this section requires coordination, as detailed in § 15.525." 47.C.F.R. § 15.511(b)(2). Section 15.525, in turn, requires operators of covered devices to provide to the Commission their "name, address and other pertinent contact information ..., the desired geographical area(s) of operation, and the FCC ID number and other nomenclature of the UWB device." *Id.* § 15.525(b). Further, if the device will be used for mobile operations, the operator must provide "the state(s) or county(ies) in which the equipment will be operated," and if the device will be used for fixed operation, the operator must provide "a specific geographical location or the address at which the equipment will be operated." *Id.* § 15.525(b). Although this information is intended to enable the Commission to coordinate use of the device with the National Telecommunications and Information Administration ("NTIA"), we understand that this coordination information is not meaningfully consulted by the Commission unless an interference issue arises, which, as noted in the text above, has not been an issue with respect to UWB devices.

²⁵ See *Kyma Medical Order*, 31 FCC Rcd at 9706 ¶ 4, 9710 ¶¶ 17-19.

Nevertheless, to ensure that a HEXWAVE user can be identified if the Commission has a need to do so, Liberty proposes for the Commission to require Liberty to maintain a database containing the same information regarding all HEXWAVE users as is required for users of UWB imaging systems under Section 15.525(b) of the Commission's rules and to provide this database to the Commission and/or NTIA upon request.²⁶ This includes contact information for HEXWAVE users and information about the locations in which the HEXWAVE system is deployed. In addition, Liberty proposes to require all purchasers of the HEXWAVE system to inform Liberty before reselling the system to any third party, as well as to require all such resale to be contingent on the third-party purchaser's compliance with any conditions that the Commission places on Liberty's requested waivers.²⁷

Finally, Liberty requests a waiver of 15.511(f), which requires a UWB surveillance system to bear a statement that operation of the device is restricted to law enforcement, fire and rescue officials, public utilities, and industrial entities.²⁸ As set forth in Proposed Condition No. 2 in Exhibit A, Liberty requests a waiver of this regulation for HEXWAVE devices to permit Liberty to add private security professionals to the list of eligible users provided by the disclosure.²⁹

²⁶ See Proposed Condition 4 in Exhibit A.

²⁷ See Proposed Condition 5 in Exhibit A.

²⁸ Section 15.511(f) requires the following statement to be displayed in a conspicuous place on imaging systems operating under the regulation: "Operation of this device is restricted to law enforcement, fire and rescue officials, public utilities, and industrial entities. Operation by any other party is a violation of 47 U.S.C. 301 and could subject the operator to serious legal penalties." 47 C.F.R. § 15.511(f).

²⁹ Thus, on HEXWAVE devices, the disclosure would be: "Operation of this device is restricted to law enforcement, fire and rescue officials, private security personnel, public utilities, and industrial entities. Operation by any other party is a violation of 47 U.S.C. 301 and could subject the operator to serious legal penalties." See Proposed Condition No. 2 set forth in Exhibit A.

III. GRANT OF LIBERTYS' WAIVER REQUESTS IS CONSISTENT WITH THE PUBLIC INTEREST

A. THE GOOD CAUSE WAIVER STANDARD

The Commission is authorized to waive its rules where the petitioner demonstrates good cause for such action.³⁰ Good cause may be found where “particular facts would make strict compliance inconsistent with the public interest.”³¹ “To satisfy this public interest requirement, the waiver cannot undermine the purposes of the rule, and there must be a stronger public interest benefit in granting the waiver than in applying the rule.”³² The Commission also has found that a waiver request satisfies the public interest requirement if grant of the waiver would serve some larger public interest objective which could not be achieved via strict application of the rule in question.³³

B. GOOD CAUSE EXISTS FOR GRANT OF THE REQUESTED WAIVER

1. The Substantial Public Interest Benefits Generated by Grant of the Waiver Outweigh Any Benefits from Strict Application of the Rules

The public interest benefits of Liberty’s HEXWAVE system are clear. Places where people gather must be protected from those who would do harm. As noted above, the threat to the public’s safety is meaningful today and only has been increasing with time. Consequently, the

³⁰ *Northeast Cellular*, 897 F.2d 1164; *WAIT Radio*, 418 F.2d 1153.

³¹ *Northeast Cellular*, 897 F.2d at 1166; *see also ICO Global Communications*, 428 F.3d at 269 (quoting *Northeast Cellular*); *WAIT Radio*, 418 F.2d at 1157-59; *Deere & Company Request for Limited Waiver of Part 15 Rules for Fixed White Spaces Device*, Order, 31 FCC Rcd 2131, 2134 ¶ 8 (OET 2016) (“*Deere & Company Order*”).

³² *Deere & Company Order*, 31 FCC Rcd at 2134 ¶ 8; *see also WAIT Radio*, 418 F.2d at 1157 (stating that, even though the overall objectives of a general rule have been adjudged to be in the public interest, it is possible that application of the rule to a specific case may not serve the public interest if an applicant’s proposal does not undermine the public interest policy served by the rule).

³³ *Deere & Company Order*, 31 FCC Rcd at 2134 ¶ 8.

need for innovative security technologies to counter such threats becomes more important every day.³⁴ DHS has recognized this need:

Protecting ST-CPs often requires a different approach than that historically used to secure hardened targets. To help more efficiently and effectively secure ST-CPs, the Department's R&D enterprise will look for novel ways to develop and transition to operational use affordable and scalable technologies that buy-down risk and that work within a free and open society that values individual rights and privacy. *This includes enhanced detection, screening, and countermeasures.*³⁵

As discussed above, the HEXWAVE system will allow law enforcement and security professionals to screen crowds in a non-intrusive, covert manner without the need to establish designated screening checkpoints. It will enhance the public's safety by detecting potential bad actors before they are able to carry out harmful actions. HEXWAVE also enhances the safety of law enforcement and security professionals by allowing them to identify suspects with concealed weapons or contraband material while at a safe, standoff distance. For these reasons, the requested waivers will provide substantial and much needed public interest benefits.

2. Strict Compliance with the Rules Is Inconsistent with the Public Interest

HEXWAVE is consistent with the types of systems envisioned for operation as UWB surveillance systems. Further, the waivers that Liberty is seeking are not significant departures from waivers that previously have been granted to other UWB companies. Consequently, as discussed above, Commission precedent demonstrates that permitting the requested variance from the Commission's rules will not undermine the policy objectives of the rules. Moreover, strict

³⁴ According to DHS, "[t]he security industry also helps develop security products and technologies that enable security professionals to address threats to ST-CPs. Through public-private partnerships, cooperative research and development agreements, industry days, and other forums, the private security industry can learn more about identified capability gaps, enabling the development of more effective security products and technological solutions." DHS Report at 3-4.

³⁵ *Id.* at 17 (emphasis added).

compliance with the rules may prevent Liberty from further developing and marketing its innovative HEWAVE system. This would deprive law enforcement and security professionals of a valuable tool that will better enable them to protect ST-CPs without disrupting public access to those ST-CPs. In turn, this would increase the risk to, and vulnerability of, the public in the areas where they congregate such as schools, places of worship, and sporting events, among others.

3. Grant of the Waivers Will Not Cause Interference to Authorized Users of the 6.9-10.6 GHz Band

The HEXWAVE system does not have any greater interference potential than currently authorized impulse UWB systems. Its CW signal sweeps through 200 MHz of spectrum in less than 910 ns. Thus, the signal only will exist in a 1 MHz bandwidth for a maximum total duration of 4.55 ns per sweep. The sweep is repeated 1536 times every 0.1 seconds, resulting in a total duty cycle within a 1 MHz bandwidth of less than approximately 7×10^{-5} . This low duty cycle makes the swept frequency signal look very much like an impulse signal inside of the 1 MHz measurement bandwidth, and also renders it highly unlikely that the system could cause interference with other authorized users. In addition, the HEXWAVE system will comply with the average radiated power limits specified for UWB surveillance systems in Sections 15.511(c) and 15.511(d).³⁶ Further, it will comply with the peak radiated emission limit in a 50 MHz bandwidth as specified for UWB surveillance systems in Section 15.511(e).³⁷ Because there is no increase in radiated power, there is no increase in interference potential as compared to impulse UWB systems.

³⁶ See 47 C.F.R. §§ 15.511(c)-(d).

³⁷ See *id.* §§ 15.511(e).

IV. CONCLUSION

For the reasons set forth herein, to enable Liberty to obtain certification of the HEXWAVE system, Liberty requests that the Commission waive Sections 15.31(c), 15.503(d), 15.511(b), 15.511(f), and 15.521(d) of its rules and impose the conditions set forth in Exhibit A. As demonstrated by this waiver request, the HEXWAVE system will generate significant safety benefits to law enforcement, security professionals, and, most importantly, the general public. These benefits will accrue without increasing the potential for interference to any authorized users of the spectrum bands in which HEXWAVE operates. Moreover, grant of this waiver request is consistent with prior waivers of the UWB rules granted by the Commission in connection with similar types of UWB systems and uses. This demonstrates that such grant will not undermine the policy objectives of the UWB rules.

Respectfully submitted,

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EXHIBIT A

PROPOSED CONDITIONS

1. The HEXWAVE security device shall be certified by the Commission and must comply with the technical specifications applicable to operation under Part 15 of 47 C.F.R, except as permitted below. For this particular swept-frequency device:
 - (a) the instantaneous bandwidth requirement in 47 C.F.R. § 15.503(d) is waived to permit operation of the swept-frequency UWB surveillance system;
 - (b) the measurement requirements in 47 C.F.R. § 15.31(c) and 47 C.F.R. § 15.521(d) are waived to permit the HEXWAVE device to be tested with the frequency sweep active, rather than stopped, to demonstrate compliance with the maximum permitted average power in Section 15.511; and
 - (c) the eligible user requirements of 47 C.F.R. § 15.511(b) are relaxed to allow use by private security personnel.
2. Each HEXWAVE system shall bear the following or substantially similar statement in a conspicuous location on the device: “Operation of this device is restricted to law enforcement, fire and rescue officials, private security personnel, public utilities, and industrial entities. Operation by any other party is a violation of 47 U.S.C. 301 and could subject the operator to serious legal penalties.”
3. Operations under this waiver will be limited to law enforcement and private security personnel.
4. Liberty shall create and maintain a record of all installations operating under this waiver, which record shall include all information set forth in 47 C.F.R. § 15.525(b). This record shall be made available to the Commission and to NTIA upon request.
5. Liberty shall inform purchasers that the HEXWAVE UWB surveillance systems may not be resold by such purchasers to third parties for use at another installation in the United States without prior notice to HEXWAVE and unless appropriate arrangements are made for the third-party buyer to meet all of the conditions of this waiver.